

Falling Particles in Fluids at Intermediate Reynolds Numbers

Acmae El Yacoubi¹, Sheng Xu², Z. Jane Wang¹

¹ *Mechanical and Aerospace Engineering, Cornell University, Ithaca NY, 14853, United States*

² *Mathematics, Southern Methodist University, Dallas, TX 75275-0156, United States*

Abstract

In this video, we present the dynamics of an array of falling particles at intermediate Reynolds numbers. The film shows the vorticity plots of 3, 4, 7, 16 falling particles at $Re = 200$. We highlight the effect of parity on the falling configuration of the array. In steady state, an initially uniformly spaced array forms a convex shape when $n = 3$, i.e the middle particle leads, but forms a concave shape when $n = 4$. For larger odd numbers of particles, the final state consists of a mixture of concave and convex shapes. For larger even numbers of particles, the steady state remains a concave shape. Below a threshold of initial particle spacing, particles cluster in groups of 2 to 3.